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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,514	03/22/2004	Wilhelm Frohs	SGL 02/23	3892
24131	7590	02/09/2006	EXAMINER DESAI, ANISH P	
LERNER GREENBERG STEMER LLP P O BOX 2480 HOLLYWOOD, FL 33022-2480			ART UNIT 1771	
DATE MAILED: 02/09/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/806,514	Applicant(s) FROHS ET AL.	
	Examiner Anish Desai	Art Unit 1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 November 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 9-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The applicant's arguments in response to the Office action dated 08/29/05 have been fully considered.

1. Applicant's election of Group I claims 1-8 drawn to a connecting piece for carbon material electrodes in the reply filed on 11/28/05 is acknowledged.
2. The 35 USC § 112 claim rejections are withdrawn.
3. All of the art rejections are maintained.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 4, and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Chuoku (GB 1548046) substantially as set forth in the 08/29/05 Office action.

With respect to claim 1, Chuoku discloses carbon electrodes with a high strength and spalling resistant for electrical furnaces wherein iron, steel and alloys are manufactured (Front page, lines 9-14) and a method of preparing carbon electrodes (Page 2, lines 42-44). The method of making the electrode comprises a mixture containing carbonaceous material such as petroleum coke, polyacrylonitrile based non-fusible fibers that are oxygenated (Page 2, lines 45-51, lines 103-106, 113-121), and a

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binder such as coal tar pitch (Page 3, lines 92-93). Chuoku further discloses the mixture comprising non-fusible fibers, carbonaceous material, and a binder wherein the mixture is shaped and backed to carbonize the non-fusible fibers simultaneously with the carbonization of the carbonaceous material and the binder (Page 4, lines 34-37). The examiner is equating the coal tar pitch binder as the claimed carbonized coating. Additionally, Chuoku teaches the carbon fibers produced by the carbonization of the non-fusible fibers wherein the carbon fibers are securely bonded to the surrounding material present in the shaped body, thus yielding high-strength carbon electrodes (Page 4, lines 44-49). Thus, the carbon fibers are present in the electrode of Chuoku. The term "carbon electrodes" also means electrode bodies and nipples (Front page, lines 14-17).

Regarding claim 4, the length of the fiber discloses by Chuoku is 1-25 mm (Page 2, lines 45-47).

Regarding claim 5, Chuoku teaches that the addition of non-fusible fibers in the amount of from 0.5 to 5% by weight (Page 3, line 79-80).

Regarding claim 7, as stated previously Chuoku discloses polyacrylonitrile based carbon fibers.

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 3 is rejected under 35 U.S.C. 102 (b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Chuoku (GB 1548046) substantially as set forth in the 08/29/05 Office action.

The invention of Chuoku as applied to the claim 1 is previously disclosed.

Chuoku teaches the claimed invention except the carbon fibers have a linear coefficient of thermal expansion of from -0.5 to $+0.1 \mu\text{m}/(\text{K}\cdot\text{m})$ in a direction parallel to a lateral surface thereof, and from 1.7 to $2.1 \mu\text{m}/(\text{K}\cdot\text{m})$ in a normal plane orthogonal thereto, however it is reasonable to presume that the carbon fibers of Chuoku have a linear coefficient of thermal expansion of from -0.5 to $+0.1 \mu\text{m}/(\text{K}\cdot\text{m})$ in a direction parallel to a lateral surface thereof, and from 1.7 to $2.1 \mu\text{m}/(\text{K}\cdot\text{m})$ in a normal plane orthogonal, because like material has like property. The applicant is using polyacrylonitrile (PAN) based carbon fibers page 11, Specification). Chuoku also teaches the use of non-

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fusible organic fibers that are converted to the carbon fibers. The non-fusible fibers of Chuoku are produced from polyacrylonitrile (Page 2, lines 103-106 and lines 114-117). Thus, the carbon fibers in the final product of Chuoku are similar to the carbon fibers of the applicant. Therefore, the presently claimed properties of the carbon fibers with a linear coefficient of thermal expansion of from -0.5 to $+0.1 \mu\text{m}/(\text{K}\cdot\text{m})$ in a direction parallel to a lateral surface thereof, and from 1.7 to $2.1 \mu\text{m}/(\text{K}\cdot\text{m})$ in a normal plane orthogonal thereto would have been inherently present. Accordingly, Chuoku anticipates or strongly suggests the claimed subject matter.

6. Claims 2 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chuoku (GB 1548046) in view of *Handbook of Carbon, Graphite, Diamond and Fullerenes – Properties, Processing and Applications* (see, Chapter 8, Table 8.6, Page 191) substantially as set forth in the 08/29/05 Office action.

The invention of Chuoku is previously disclosed. As stated previously, Chuoku teaches polyacrylonitrile (PAN) based non-fusible fibers that are converted to the carbon fibers. Although Chuoku is silent with respect to teaching the claimed modulus, the PAN fibers with the claimed modulus are well known in the art as shown in the *Handbook of Carbon, Graphite, Diamond and Fullerenes – Properties, Processing and Applications* (see, Chapter 8, Table 8.6, Page 191). Thus a skilled artisan would have found it obvious to use the carbon fibers having the claimed modulus in the mixture of Chuoku to form the electrodes having excellent strength.

Regarding claim 6, Chuoku discloses the claimed invention except that the mass fraction of the coating on the carbon fibers, based on the mass of the carbon fiber is

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from 0.5 to 15%. Note that the mass fraction of the coating is considered as a result effective variable. As the amount of coating increases, the mass fraction of the coating on the carbon fiber increases which results in a stronger adhesion of the carbon fiber with the matrix. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the claimed mass fraction, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chuoku (GB 1548046) in view of Lewis et al. (US Patent 5,413,738).

The invention of Chuoku is previously disclosed. Chuoku is silent as to teaching of disposal of the carbon fibers in the form as claimed in the claim 8. However, Lewis et al. teach a unitary composite structure having improved flexural strength and a reduced coefficient of thermal expansion comprising combination of carbonaceous reinforcing materials interbonded with pitch (see abstract). Additionally, Lewis et al. teach that their invention is applicable in the field of carbon-carbon composites and is most applicable to graphite electrodes (Column 1, lines 10-15). The fibers used for the carbonaceous reinforcing material may be woven, non-woven or knitted (Column 13, lines 1-5). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the carbon fibers of Lewis et al. in the form of woven, non-woven or knitted and used it in the invention of Chuoku, motivated by the desire to obtain a carbon electrode with the improved properties such as flexural strength and reduced coefficient of thermal expansion.

Response to Arguments

8. Applicant's arguments filed on 11/28/05 have been fully considered but they are not persuasive.

9. Applicant's election of Group I claims 1-8 drawn to a connecting piece for carbon material electrodes in the reply filed on 11/28/05 is acknowledged. Because the applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

10. The 35 USC § 112 claim rejections are withdrawn in view of the present amendment and response (see pages 7 and 8 of the 11/28/05 amendment).

11. The art rejection of claims 1, 4, and 5 under 35 USC Section 102 as being anticipated by Chuoku (GB 1548046) is maintained for the following reasons.

The applicant argues that Chuoku describes the use of oxidatively stabilized PAN fibers (also called PANOX fibers), which is an intermediate product in the manufacturing of carbon fibers. Further, Chuoku teaches disadvantages of the prior art that carbon fibers are expensive because they are manufactured via the "PANOX" step, followed by carbonization and graphitization and that Chuoku describes the use of PANOX fibers but not the use of treated carbon fibers. Applicant further argues that Chuoku teaches disadvantages of the prior art that carbon fibers behave remarkably different in the coke and binder matrix and hence impairing the reinforcing effect. The arguments are not found persuasive for patentability because the claims are not directed to an

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intermediate product but rather a final product containing carbon fibers. It is recognized that Chuoku uses a different approach to form a carbon electrode, however, the final product of Chuoku is not structurally different from the carbon electrode of the present invention. Although Chuoku teaches the prior art carbon electrodes comprising carbon fibers are expensive because of the processing requirements of the carbon fibers and that the carbon fibers behave remarkably different in the coke and binder matrix, the final product of Chuoku ~~dos~~ contain the carbon fibers. In fact, in order to overcome the disadvantage of the prior art carbon fibers, Chuoku discloses a process in which a mixture comprising carbonaceous material, non-fusible organic fibers based on polyacrylonitrile, and a binder is shaped and backed to obtain carbon electrodes (Page 2, lines 45-55 and lines 55-60). Additionally Chuoku also teaches the conversion of non-fusible fibers to carbon fibers during the backing step (Page 2, lines 70-75 and lines 97-99, Page 4, lines 44-46) where the carbon fibers are securely bonded to the surrounding materials whereby the carbon electrode is further strengthened (Page 2, lines 97-101). Although Chuoku does not use the carbon fibers as raw material in producing the carbon electrodes but rather the non-fusible fibers, the final product of Chuoku comprises carbon fibers as previously stated.

The applicant argues that the suggested use of PANOX fibers according to Chuoku will result in evolution of various volatiles during carbonization and graphitization resulting disintegration of the "in situ" generated carbon fibers and, even worse, cracking of the carbon/graphite body. Hence, the suggested use of PANOX fibers according to Chuoku is rather weakening the strength of carbon/graphite electrodes.

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The applicant's argument is not found persuasive because the argument is not commensurate with the scope of the claims. Nothing specific about PANOX fibers is included in the claims.

The applicant argues that Chuoku does not show carbon fibers in the said carbon piece body as required by the claim 1. The examiner respectfully disagrees. As stated previously, Chuoku clearly discloses the conversion of non-fusible fibers to carbon fibers during the backing step (Page 2, lines 70-75 and lines 97-99, Page 4, lines 44-46) where the carbon fibers are securely bonded to the surrounding materials whereby the carbon electrode is further strengthened (Page 2, lines 97-101). Thus, the carbon electrode of Chuoku does comprise carbon fibers.

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Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anish Desai whose telephone number is 571-272-6467. The examiner can normally be reached on Monday-Friday, 8:00AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on 571-272-1478. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

APD

HaVo

**HA/VO
PRIMARY EXAMINER**